**The Case of the “Mystery Resistor” \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Wet Lab**

**Purpose:** In this activity, you will investigate the relationship between the electric current and the potential difference flowing through several mystery resistors and a load. By understanding this relationship, you will be able to solve the value of the resistors.

**Hypothesis:** As the electric current increases, we would expect the potential difference to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Materials:**

Variable power supply Ammeter

(6) Connecting Wires Voltmeter

(2) Resistors Bulb

Switch

**Method:**

1. Connect the circuit shown here.
2. Adjust the power supply to give the values shown in the following table. Record the potential differences and ammeter readings in the table.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Electrical Current | |
| Setting on Power Supply (V) | Potential Difference (V) | (mA) | (A) |
| 0 |  |  |  |
| 1.5 |  |  |  |
| 2.2 |  |  |  |
| 3.0 |  |  |  |
| 4.5 |  |  |  |

1. Open the switch. Replace the first resistor with the second resistor. Repeat step 2.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Electrical Current | |
| Setting on Power Supply (V) | Potential Difference (V) | (mA) | (A) |
| 0 |  |  |  |
| 1.5 |  |  |  |
| 2.2 |  |  |  |
| 3.0 |  |  |  |
| 4.5 |  |  |  |

1. Open the switch. Replace the second resistor with the bulb. Repeat step 2.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Electrical Current | |
| Setting on Power Supply (V) | Potential Difference (V) | (mA) | (A) |
| 0 |  |  |  |
| 1.5 |  |  |  |
| 2.2 |  |  |  |
| 3.0 |  |  |  |
| 4.5 |  |  |  |

**Observation:**

1. Draw a circuit diagram for this circuit.
2. Plot all of the values on ONE graph that shows the potential difference against current for the two resistors and the bulb. Plot current (A) on the x-axis and the potential difference (V) on the y-axis. Use a different colour or plotting symbol for each set of data.
3. For each resistor, draw a straight line of best fit through the data points.
4. For the bulb, draw a curved line of best fit through the data points.
5. Calculate the slope for the lines of the resistors. Show all your calculations and units.
6. For the bulb, calculate the resistances for each data point using Ohm’s Law.

**Discussion:**

1. What is the resistance of the first resistor?
2. What is the resistance of the second resistor?
3. How does this relationship differ for the lightbulb? Is a lightbulb an ohmic resistor? Explain your answer.
4. What can you infer about the resistance of the lightbulb as the current through it increases?

**Conclusion:**

In a short paragraph, summarize three important scientific concepts demonstrated in this lab.